

Table SINV-35

## International patent families granted in thermal processes and apparatus, by region, country, or economy: 1998–2020

(Number)

Region, country, or economy	Economy by income status	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
World	na	6,654	8,376	6,644	6,403	6,340	6,428	7,027	7,424	9,652	9,271	8,099	8,401	8,425	9,495	11,699	12,171	12,967	12,649	15,100	16,595	15,920	17,032	16,953
North America	na	798	807	749	806	727	750	718	616	618	495	414	438	575	589	632	673	741	855	874	973	921	1,133	1,108
Canada	High	71	58	54	60	51	48	60	46	48	53	51	43	45	44	57	52	47	68	63	69	67	66	68
Mexico	Upper middle	2	3	6	5	5	2	2	1	3	2	1	1	1	4	1	1	5	6	13	17	16	13	7
United States	High	725	745	689	741	671	700	657	570	567	441	362	395	529	541	573	620	690	781	798	887	839	1,054	1,034
Central America and Caribbean	na	0	0	1	1	1	0	0	0	1	0	0	1	0	1	2	2	3	0	1	1	1	2	1
Puerto Rico	High	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
South America	na	1	3	19	17	10	12	9	6	11	11	8	19	29	24	21	15	15	16	12	22	18	19	42
Argentina	Upper middle	0	0	1	0	1	2	0	1	0	1	0	1	2	0	0	0	0	1	0	0	0	1	1
Brazil	Upper middle	0	2	17	16	9	7	7	4	10	9	8	19	27	23	21	14	14	14	10	20	16	16	39
Europe	na	1,844	1,821	1,779	1,645	1,715	1,792	1,953	1,703	1,616	1,599	1,573	1,750	1,709	1,638	1,913	1,887	1,785	1,923	1,896	2,257	2,194	2,370	2,060
EU-27 + UK <sup>a</sup>	na	1,326	1,369	1,353	1,259	1,256	1,194	1,295	1,197	1,144	1,050	995	1,069	1,183	1,201	1,472	1,366	1,337	1,387	1,524	1,752	1,719	1,926	1,652
United Kingdom	High	95	88	90	64	78	73	68	110	62	40	42	53	63	53	72	65	48	69	89	70	77	77	103
EU-27 <sup>b</sup>	na	1,231	1,281	1,263	1,195	1,179	1,121	1,227	1,087	1,081	1,009	954	1,016	1,119	1,148	1,400	1,300	1,289	1,317	1,435	1,682	1,642	1,849	1,550
Austria	High	58	62	55	56	82	67	37	41	42	27	46	52	73	40	78	62	49	49	59	61	42	47	43
Belgium	High	7	8	12	7	10	10	12	13	8	9	9	6	14	13	12	23	19	23	47	42	44	39	37
Denmark	High	16	11	12	13	18	16	20	13	24	15	23	30	20	24	17	31	26	30	42	28	36	42	45
Finland	High	41	31	27	26	38	35	28	27	14	31	20	34	26	28	38	40	28	49	38	29	41	26	40
France	High	236	215	214	223	157	135	162	140	184	174	139	128	154	119	312	243	263	230	232	298	321	510	352
Germany	High	458	471	449	494	517	547	498	465	512	427	381	392	397	380	444	458	436	511	534	569	542	600	563
Hungary	High	6	6	4	5	4	1	1	2	2	1	2	3	2	2	2	8	7	7	7	2	3	5	2
Ireland	High	6	9	3	0	0	3	5	3	4	2	8	14	10	11	10	11	11	10	9	6	8	2	11
Italy	High	141	205	228	106	102	71	219	123	26	33	43	44	74	117	100	39	31	40	44	273	216	183	104
Netherlands	High	79	80	89	79	59	62	75	60	70	58	54	57	70	71	83	72	53	66	67	64	55	86	66
Spain	High	29	32	33	32	31	35	33	59	59	68	71	69	107	122	107	108	152	105	105	100	71	63	30
Sweden	High	51	54	49	57	70	72	69	39	55	45	38	55	56	52	40	34	27	45	35	42	61	59	86
Other Europe	na	518	452	426	386	459	598	657	506	472	549	577	681	527	438	442	521	448	537	372	504	475	444	408
Other Europe-2020 <sup>b</sup>	na	613	540	517	450	537	671	726	616	534	589	619	734	590	491	514	587	496	606	461	575	552	521	510
Belarus	Upper middle	1	1	3	2	1	0	4	4	4	4	1	7	4	1	5	2	1	0	1	6	7	0	2
Moldova	Lower middle	2	3	0	5	7	8	3	9	5	2	3	10	8	3	2	4	3	5	3	2	1	3	4
Norway	High	16	11	13	9	13	18	8	8	10	9	10	6	12	11	9	14	10	11	10	14	5	9	6
Russia	Upper middle	435	372	353	306	373	465	404	402	386	421	445	521	375	319	329	393	329	397	230	365	354	350	317
Switzerland	High	46	44	46	47	42	39	35	21	41	38	34	30	32	26	32	36	45	56	51	45	56	37	46

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Ukraine	Lower middle	16	19	10	13	22	61	201	60	24	70	77	97	85	62	50	62	46	49	40	38	30	13	3
Asia	na	3,941	5,620	3,973	3,831	3,778	3,772	4,235	4,975	6,993	7,081	6,029	6,115	6,014	7,160	9,038	9,489	10,336	9,772	12,238	13,266	12,737	13,437	13,670
China	Upper middle	27	29	113	92	89	312	403	429	500	580	998	1,821	1,681	1,987	2,821	2,595	2,865	4,733	6,332	7,534	7,410	7,942	8,436
India	Lower middle	2	1	4	1	1	3	2	2	3	4	3	3	3	6	9	6	10	8	14	12	20	20	29
Japan	High	3,202	3,687	3,096	2,928	2,719	2,421	2,652	2,990	3,802	3,573	3,165	3,102	2,953	3,388	3,803	4,123	4,692	2,966	3,728	3,517	3,298	3,182	2,743
Malaysia	Upper middle	0	0	0	1	1	2	2	1	8	5	0	3	3	3	0	7	6	6	1	4	8	1	3
Singapore	High	1	2	2	2	4	3	3	3	2	1	1	3	2	1	4	3	2	2	3	3	3	4	1
South Korea	High	660	1,843	713	700	878	946	1,065	1,442	2,488	2,726	1,716	1,017	1,215	1,641	2,231	2,524	2,525	1,836	1,867	1,886	1,718	2,068	2,246
Taiwan	High	45	56	42	105	84	80	104	107	188	192	143	160	153	129	169	225	232	215	286	302	274	214	204
Middle East	na	4	8	11	15	13	12	7	14	6	12	8	7	9	10	11	20	24	24	26	33	20	27	25
Israel	High	3	7	7	9	7	11	5	9	4	6	4	3	5	7	4	8	14	13	12	13	8	9	11
Africa	na	26	29	33	26	22	20	13	23	17	24	20	26	37	18	26	25	23	7	5	12	5	5	5
South Africa	Upper middle	23	25	29	22	16	11	10	20	15	22	19	26	36	12	21	18	11	5	4	8	1	2	3
Australia and Oceania	na	31	50	57	56	67	72	80	61	49	41	42	38	51	51	52	58	39	39	46	29	24	38	40
Australia	High	30	45	53	54	63	70	76	56	45	39	39	32	43	44	45	51	29	32	38	23	20	33	38
New Zealand	High	1	5	3	2	4	2	4	5	4	2	2	6	8	7	7	7	9	8	8	7	4	5	2
Unclassified	na	9	38	21	7	7	0	11	25	341	9	6	5	1	4	2	1	1	12	2	2	1	2	2

na = not applicable, metric not calculated at this level.

EU = European Union; UK = United Kingdom.

<sup>a</sup> The United Kingdom was a part of the EU for data purposes from 1973 to 2019.<sup>b</sup> Beginning in 2020, the United Kingdom was no longer a member of the EU.**Note(s):**

International Patent Documentation (INPADOC) patent families across all patent offices covered in the Worldwide Patent Statistical Database (PATSTAT) are counted according to the year of the first granted patent in the patent family. Patent families are allocated according to patent inventorship information found on the priority patent of the INPADOC patent families. To account for missing ownership information in PATSTAT for some offices, a method designed by de Rassenfosse et al. (2013) is used to fill missing information on priority patents using information in successive filings within the families. Priority patents not indexed in PATSTAT are replaced by the next utility patent(s) in the families according to filing dates. Patent families are fractionally allocated among regions, countries, or economies based on the proportion of residences of all named inventors. Patents are classified under the World Intellectual Property Organization (WIPO) classification of patents, which classifies International Patent Classification (IPC) codes under 35 technical fields. IPC reformed codes take into account changes that were made to the WIPO classification in 2006 under the eighth version of the classification and were used to prepare these data. China includes Hong Kong. Data were extracted in June 2021. Because of data coverage issues for some patent offices in PATSTAT, statistics for some countries may be underestimated partially for some years or across the whole trend. Countries with identified issues include India (missing data) and South Africa (no data for 2018). For Italy, because of data gaps regarding information on granted patents, patent applications are used instead, which slightly overestimates Italy's output and creates a small shift in year for which its output is accounted. As patent authorities become more involved with the European Patent Organisation, these gaps should disappear in the future, strengthening the robustness of statistics for these countries.

**Source(s):**

National Center for Science and Engineering Statistics; Science-Metrix; PATSTAT, accessed October 2021.